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A Prospective Longitudinal Study of Social, Psychological and Obstetric Factors in Pregnancy: Response Rates and Demographic Characteristics of the 8556 Respondents

J. D. KEEPING, J. M. NAJMAN, J. MORRISON, J. S. WESTERN, M. J. ANDERSEN, G. M. WILLIAMS

Abstract

This paper introduces the Mater Misericordiae Mothers' Hospital-University of Queensland Study of Pregnancy, a prospective study of 8556 pregnant women interviewed at their first clinic visit, and subsequently interviewed some days after the birth of the baby and again 6 months later. Additional data were derived from the medical record of the pregnancy and delivery. The study was designed to assess the impact of social, psychological and obstetric factors on pregnancy outcome. We present here details of the study design, sampling, response rates and demographic characteristics of the sample.

In recent years improved diagnosis and management of obstetric complications have made a major contribution to the decline in maternal and perinatal mortality and morbidity (Black *et al.* 1982). The development of neonatology emphasizes the impact of technology and intervention on reproductive outcome and there is little doubt that obstetric innovations in the years ahead will further reduce the risks associated with childbirth. The acknowledgment of these obstetric contributions, past and present, is unequivocal. However, there is reason to believe that an ever-decreasing amount of reproductive morbidity will be influenced by purely obstetric or technological innovations.

It is probable that a significant proportion of the remaining obstetric morbidity is related to the social and psychological background and lifestyle of pregnant women. These factors include socio-demographic characteristics of the woman (Dott & Fort 1975; Brennan & Lancashire 1978; Eisner *et al.* 1979; Hendershot 1979; Brooks 1980; Osbourne *et al.* 1981; Robinson *et al.* 1982; Naeye & Peters 1982; Carr-Hill *et al.* 1983; Murphy *et al.* 1984; Ericson *et al.* 1984), her attitude to the pregnancy (Newton & Newton 1962; Heinstein 1967; Pohlman 1969; Laukaran & van den Berg 1980), her mental health state (Gunter 1963; Nuckolls *et al.* 1972; Jones 1978; Standley *et al.* 1979; Newton *et al.* 1979), and such behavioural factors as cigarette smoking (Meyer *et al.* 1976; Rantakallio 1979; Harlap & Shiono 1980), alcohol consumption (Jones *et al.* 1974; Hanson *et al.* 1976; Ouellette *et al.* 1977; Olegsard *et al.* 1979; Harlap & Shiono 1980; Kline *et al.* 1980; English & Bower 1983), analgesic use (Turner & Collins 1975) or the decision to work during pregnancy (Waldron *et al.* 1982; Chamberlain & Garcia 1983; Saurel & Kaminski 1983; Mamelle *et al.* 1984).

Although individual studies have identified many of the factors which might cause obstetric and perinatal morbidity, there was seen to be a need for a more broadly based study which traced the causal path between socio-demographic factors, attitudes to pregnancy, the woman's mental health and her lifestyle as these interact and contribute to the outcome of the pregnancy. To determine the multifactorial impact of these variables on obstetric outcomes, a prospective longitudinal study was started in Brisbane in 1981.

Table 1. Public and private births at the Mater Misericordiae Mothers' Hospital (MMH) and in Brisbane, 1981-1984

Year	Patients	MMH		Brisbane		MMH/ Brisbane
		n	(%)	*n*	(%)	
1981	Public	3827	(61.8)	7012	(48.5)	54.6
	Private	2370	(38.2)	7452	(51.5)	31.8
1982	Public	3836	(57.6)	6667	(43.5)	57.5
	Private	2826	(42.4)	8654	(56.5)	32.7
1983	Public	4185	(59.2)	7190	(46.3)	58.2
	Private	2879	(40.8)	8338	(53.7)	34.5
1984	Public	4319	(65.2)	7047	(47.2)	61.3
	Private	2304	(34.8)	7898	(52.8)	29.2

This paper gives details of the background, selection of patients, methods of sampling, data management, the response rates and demographic and obstetric characteristics of the 8556 participants in the study. It provides a description of the sample to facilitate the interpretation of subsequent papers, and to enable a comparison of the data from this study with that of other studies.

Background

The Mater Misericordiae Mothers' Hospital (MMH) is one of two major obstetric units in Brisbane (estimated population of the Brisbane Statistical Division 1,096,200 at 30 June 1981), and delivers between 6000 and 7000 patients per year, of whom about 60% are public and the remainder are private (Table 1).

Public patients are patients who attend a free hospital clinic for antenatal care and are delivered under the supervision of full-time and visiting medical staff. There is no means testing in Queensland for the use of this facility, and indeed Queensland public hospitals function in a similar manner to British National Health Service hospitals.

Private patients attend obstetricians for ante-natal care on a fee-paying basis, are delivered in the hospital, pay room and service fees, and are totally supervised and delivered by their private obstetrician. For most, the fees are largely covered by voluntary health care insurance. The same obstetricians also supervise the care of most of the public patients delivered in this hospital.

Since 1973 the Mater Mothers' Hospital has kept computerized records, containing 191 variables, on all public and private patients. Unfortunately these data did not address the social and psychological factors of potential interest. As a result, a combined project involving interested members of the departments of obstetrics and gynaecology, social and preventive medicine, and anthropology and sociology was started.

Preparation, piloting, validation of questionnaires and logistic details were conducted during 1980. The study proper started on 5 January 1981, and received National Health and Medical Research Council (NHMRC) research funding for 1982-1984 inclusive. This project has now received additional NHMRC funding (1986-1988) for an extension of the original project, to follow up the mothers and the children who are now 5 years of age.

Study details

The study was conducted in the following time sequence.

Phase I. A 117-item questionnaire was provided at the first antenatal visit. This contained a number of scales and questions addressed to the broad areas of marital

circumstances, social security benefits, income, housing, employment, education, occupation, migrant status, race, religiosity, drug ingestion, anxiety/depression, quality of life, subjective/objective stress, pregnancy attitudes/desires and health habits. Most of the demographic data were collected in phase I. The questionnaire was given to the respondent patients by research staff. Any help required to complete the questionnaire due to language or education difficulties was noted.

Phase II. A 103-item questionnaire was given to participants of phase I between the 3rd and the 5th postpartum day. This questionnaire assessed changes which had occurred during pregnancy and also extended into the areas of future family planning, antenatal care, health in pregnancy, social supports, labour and attitudes to the baby.

Phase III. A 103-item mailed questionnaire was completed 6 months after delivery. Apart from a number of items to assess change between the different phases, it particularly examined the areas of social supports, postpartum health, and baby health, development and rearing. Follow-up phone reminders and home visits were used, when necessary, to maximize the response rate.

Phase IV. A 97-item protocol of obstetric data was derived from the hospital records by the study team.

Table 2. Age, marital status and parity by response rate on four occasions when data were collected

	Phase I *n*	Phase II response (%)	Phase III response (%)	Phase IV confined (%)
Age (years)				
< 16	196	90	74	94
17-25	5070	87	78	90
26-35	3020	87	83	92
≥ 36	270	80	76	87
Total	8556			
Variation among groups (*P*)		<0.01	<0.001	<0.05
Marital status	935	86	70	90
Single				
Living together	1005	86	74	89
Married	6183	89	84	92
Other	245	80	71	87
Total	8368			
Variation among groups (*P*)		<0.001	<0.001	<0.01
Family income ($)	2805	85	75	90
0-10 399				
10 400-25 999	4780	90	85	92
≥ 26 000	270	87	84	90
Total	7855			
Variation among groups (*P*)		<0.001	<0.001	<0.01
Previous births, live and still	3492	87	79	91
Nil				
One or more	5064	86	80	91
Total	8556			
Variation between groups		NS	NS	NS

NS, Not significant.

Format of questionnaires

Where possible, use was made of existing or adapted versions of validated scales and indices such as DSSI (Foulds & Bedford 1976*a*, *b*; Bedford & Foulds 1977, 1978;

Bedford 1977) to measure neurotic anxiety/depression, and life-style indices from the Alameda study (Belloc & Breslow 1972; Breslow & Enstrom 1980) and marital adjustment developed by Spanier (1976). Standard, shortened and new scales and questions were used only after extensive piloting to assess their reliability and validity.

Data Management

Confidentiality was ensured by using code numbers on all questionnaires, the master code being kept separate and secure.

Returned questionnaires were cleaned, coded, entered and verified on Apple II computers by our research staff. Intermittent transfer of data from floppy disk to University of Queensland PDP 10 computer was performed to provide adequate space for storage and data analysis, and both hard and soft copies were retained for safety in different locations.

The final data file containing the above items plus desired scales and indices for each patient was arranged in 1022 database management system (System 1022 *Users Reference Manual, 1983* format) and basic analysis conducted using standard SPSS programs (Nie *et al. 1975).* This was later transferred to the IBM computer and SAS system *(SAS User's Guide: Basics* 1985) used for analysis.

The sample

In order to assess the internal and external validity of the study findings, the sampling methods, response rates and sample composition are considered below.

Table 3. Comparison of public and private patients delivered at the MMH (1.1.82 to 31.12.84)

	Public (*n*=12029) (%)*	Private (*n*=8182) (%)*
Age (years)		
≤ 16	2	0.1
17-25	57	24
26-35	38	70
≥ 36	4	6
Marital status		
Single	13	
Living together	5	0.4
Married	80	98
Other	2	0.6
Medical outcomes		
Gestation ≤ 36 weeks	6.8	5.5
Low birthweight (<1500 g)	1.5	1.1
Low Apgar score at 5 min (≤6)	2.4	2.2
Special care nursery admission	6.7	5.2

* Due to rounding total does not always equal 100.

Sampling method and response rates

Data collection began in 1981, according to the following protocol. All public patients seeking obstetric care from this hospital are routinely given an initial appointment for an antenatal clinic visit. Women given such appointments were listed before their attendance and an enrolment questionnaire was prepared for them. Data collection was reduced to all women presenting every second week, for a period, due to resource

constraints. At first contact, women were invited to participate in the study. Only 98 (1%) of the 8556 women invited to participate declined the invitation.

Excluded from the study were patients under the care of private obstetricians and patients, often requiring intensive neonatal care, transferred from other hospitals. The response rates for phases I, II and III were respectively 99%, 87% and 81%. The major reasons for the fall in response rates between phases I and II were patients having miscarriages or leaving this area, and between phases II and III (a 6-month period) failure to trace the patient due to change of residence and/or name and lack of a forwarding address. Those lost to follow-up were pre-dominantly young, single, and in the lowest income group, as can be seen when the response rates to each of the three phases were analysed in relation to age and marital status (Table 2). The number of previous births was not related to variations in response rates at each phase.

The sample in relation to public deliveries in Brisbane

Brisbane is a large city in area, divided more or less in half by the Brisbane river. The Mater Mothers' Hospital predominantly serves the obstetric needs of women on the south side of the river, while the other major hospital (The Royal Women's Hospital) provides obstetric services to those on the north side of the river. Table 1 compares the number of births at the Mater Mothers' Hospital with those of similar status (public/private) in Brisbane as a whole during the data collection period. The Mater Mothers' Hospital accounted for between 54.6% and 61.3% of all public patients delivered in Brisbane.

Table 4. Perinatal mortality rates (per 1000 births) for MMH, Brisbane (including MMH), and Queensland (including Brisbane)

	MMH			
Year	Public	Private	Brisbane	Queensland
1981	13.7	12.6	14.4	14.7
1982	9.3	11.9	12.4	13.1
1983	12.4	12.5	12.2	12.6
1984	12.0	14.7	11.0	11.9

Public and private statistics not obtainable for Brisbane or Queensland.

Perinatal deaths include all stillbirths > 20 weeks gestation or ≥ 400g and neonatal deaths within 28 days of birth. MMH figures from all deliveries excluding all transfers *in utero* with irretrievable situation.

Sample validity and the exclusion of private patients

This study involved and followed a unique cohort. In its defence it should be noted that many longitudinal studies have used non-representative samples and obtained results which have been found subsequently to reflect associations existing in the broader community. However, the selection of public patients in this study imposes the need for a careful assessment of the extent to which the findings reflect more generally prevalent patterns of association. Limiting the sample to public patients does not, of itself, invalidate the findings which will be reported in subsequent papers, but raises questions about the external validity of the results which can only be addressed using evidence from other studies. Tables 3 and 4 consider in greater detail the comparison between public and private patients with respect to their pregnancies and outcomes.

Table 3 is taken from the hospital records of all deliveries at the Mater Mothers' Hospital over a 3-year period during which most of the data for this study were collected.

Public patients tend to be more often concentrated in the youngest age group and to be single. However, there are no major differences in the crude obstetric out-comes between public and private patients (gestation at delivery, birthweight, Apgar score and admission to special care nursery) and perinatal mortality. Perinatal mortality rates for the MMH (public and private), Brisbane and Queensland are compared in Table 4. Interestingly, the perinatal mortality rates for all four comparison groups appear to be similar.

Demographic characteristics of sample

In this paper we limited ourselves to a brief review of some of the salient features of our sample. Subsequent papers will present details of the specific association between the characteristics of our sample and adverse pregnancy outcomes. Although the survey was conducted in a Roman Catholic Maternity Hospital, the participants' stated religious affiliations correspond to those of the total Brisbane population (Table 5) in most respects. Only 14.5% (1211) women claimed to be regular church attenders.

Table 5. Religious affiliation of respondents and women in Brisbane

Religious affiliation	Respondent (*n*=8556) (%)*	Brisbane (*n*=352 093) (%)
Roman Catholic	28	27
Anglican	30	26
Other Christian	22	26
Non-Christian	1	12
No religion	14	9
Not stated	6	--

* Due to rounding total does not equal 100.

When the partner's occupation is examined (Table 6) it is apparent that this sample is skewed towards the blue collar and manual workers and under-represents professional, administrative and clerical workers, although a broad range of occupations is represented in the sample.

Table 6. Occupation of partners of respondents and men in Brisbane

Occupation	Census codes	Partner (*n*=8556) (%)	Brisbane (*n*=188 996) (%)
Professional, administrative	(0,1)	11	22
Clerical	(2)	5	12
Sales	(3)	5	8
Farmers, fishermen	(4)	2	1
Miners, transport, communication	(5,6)	9	7
Tradesmen, process worker	(7,8)	52	38
Service, sport, armed services	(9,10)	5	8
Unknown, inadequately described		11	4

The educational attainments of both the participants and their partners are shown in Table 7 and a close parallel between the two appears evident. Completion of school at 16 and 18 years in Queensland corresponds to the lower and higher leaving certificate examinations elsewhere. Unfortunately the census question relating to education does not permit a direct comparison with the Brisbane population.

The stated family income (Table 8) reflects the lower socio-economic status of the

survey group. Only 3·4% of respondents report an income of $26 000 or more (compared with 19% for Brisbane as a whole).

A relatively high proportion, 41.7% (3464), either owned or were in the process of buying their house, while 40.7% were renting and a further 14.5% were living with relatives or parents. The remainder lived in caravans, hostels, etc., and of the whole group 12.1% reported they were experiencing some difficulty with accommodation. The racial origins of the survey group were predominantly white – 91.8% (7511), with 3.7% (305) Asian, 1.8% (149) Maori and Islanders, and 2.3% (188) Australian Aborigines. A further 0·7% (48) of women reported a mixed racial background. The age distribution of the 8556 patients who participated in the survey and their partners is shown in Table 9.

Of the total survey cohort of 8556 patients, 2789 (32.6%) were primigravidae. The past obstetric history of the remaining 5767 included 12 161 previous pregnancies, of which 2276 (18.2%) ended in miscarriage before 20 completed weeks gestation, 739 (6.1%) were reported to have been terminated, and 59 (0.5%) were ectopic pregnancies. The 9087 previous pregnancies which continued after 20 weeks resulted in 9149 babies, which included 60 sets of twins and one set of triplets. There were 133 stillbirths, 116 neonatal deaths (day 1-28 after delivery), and a further 78 died during infancy or childhood.

Lifestyle characteristics

Only 43.3% of the participants stated that they had planned to become pregnant, 10.4% were unsure, and 46.3% had not planned this pregnancy. In a corroborative question only 49.3% of women stated that they had ‘wanted to get pregnant’. Details of the socio-demographic characteristics of women having unplanned pregnancies have already appeared (Najman *et al.* 1984). In relation to health habits, 51.1% of women reported smoking before the pregnancy and 40.1% had smoked in the week before the first clinic contact. Some 9.5% of women reported smoking 20 or more cigarettes a day. Alcohol use before conception was reported by 74.5% of the sample and by 49.6% after conception. Only a small percentage (4.0%) reported alcohol use a few times a week or more, early in pregnancy. A significant percentage (17.3%) of women claimed to have used marijuana before the pregnancy and 3.1% reported marijuana use early in pregnancy.

Table 7. Education of respondents and their partners

Education	Respondent *(n=8556)* (%)	Partner *(n=8556)* (%)
No school or opportunity school	1	1
Primary school	4	4
Started secondary school	14	12
Left school	53	45
15-16 years		
17-18 years	9	12
College, trades, etc	14	14
University	3	4
Other/unknown	2	8

Table 8. Comparison of family/household incomes of respondents and Brisbane residents (for approximately similar income categories)

Family income of respondents ($)	*(n=8556)* (%)	Household income of Brisbane residents ($)	*(n=233 324)* (%)
0-10 399	33	0-10 000	28
10 400-25 999	56	10 001-26 000	46
≥ 26 000	3	≥ 26 001	19
Unknown	8	Unknown	7

Discussion

A number of social and psychological factors have been associated with poor obstetric outcome. Outstanding are the observations by Baird (1973) in relation to social class. Social class itself is an abstract concept based on a variety of subfactors as described by Najman *et al.* (1979), and Siskind *et al.* (1987), Jones (1978) and Newton *et al.* (1979) have noted associations between stress and labour complications and preterm delivery respectively, although the effects of stress on health and obstetric outcome can apparently be reduced by strong social supports (Nuckolls *et al. 1972).*

Various behavioural problems, such as failure to obtain adequate antenatal care (Keeping *et al.* 1980), cigarette smoking, excessive alcohol consumption, work in the third trimester and contact with or ingestion of a wide variety of chemicals (Hill & Stern 1979) have also correlated with less favourable obstetric outcome.

Table 9. Age of respondent and partner

Age (years)	Respondent *(n=8556)* (%)*	Partner *(n=8556)* (%)*
≤ 16	2	0.1
17-25	59	37
26-35	35	45
≥ 36	3	10
Unknown		8

* Due to rounding totals do not equal 100.

While these findings from previous studies are of interest and of clinical importance in defining risk factors in pregnancy, they fail to demonstrate the path by which there is an effect on obstetric morbidity and mortality.

We have specifically embarked on a broadly based longitudinal study and accept that we have had to abandon some depth in certain areas in order to cover a wider range of factors but suggest this is a necessary compromise.

It is also relevant to note the diminished response rate with each phase (although this is expected in such surveys) as the main loss especially in phase III is due to untraceable change of domicile and/or name. Another concern is the relative infrequency of some outcomes (e.g. perinatal death), although the large sample size and the frequency of other outcomes (e.g. pre-term delivery, low birthweight) provides adequate numbers of cases for the purpose of comparison.

The demographic and obstetric characteristics we have described for our study group are not only necessary for accurate comparisons but underline the range of variables which have to be considered in the eventual analysis to determine the proper weighting to be assigned to social, psychological, behavioural and obstetric factors as these influence obstetric outcomes.

Conclusion

In recent years there has been considerable interest in the extent to which the social environment, lifestyle and mental health can influence the outcome of pregnancies. In contrast to the established and sophisticated research efforts aimed at identifying the pathological basis of obstetric morbidity, we find that much research which has investigated the social and behavioural environment of the mother and child has provided important insights but left many questions unanswered. The results of many previous studies, largely focusing on single factors, need to be amalgamated by identifying the independent contributions and interaction of a wide range of social, psychological and obstetric factors in pregnancy outcomes. We are directing our efforts to this end for our sample of Brisbane women. This initial paper details the characteristics of our sample to enable other researchers to assess the more general relevance of our results which will appear in a series of subsequent papers.

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